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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,676	01/24/2006	Hachishiro Iizuka	284901US26PCT	5546

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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C.  
1940 DUKE STREET  
ALEXANDRIA, VA 22314

EXAMINER

CHEN, KEATH T

ART UNIT	PAPER NUMBER
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1792

NOTIFICATION DATE	DELIVERY MODE
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11/09/2007

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<p align="center"><b>Office Action Summary</b></p>	<p><b>Application No.</b></p> <p>10/565,676</p>	<p><b>Applicant(s)</b></p> <p>IIZUKA, HACHISHIRO</p>	
	<p><b>Examiner</b></p> <p>Keath T. Chen</p>	<p><b>Art Unit</b></p> <p>1762</p>	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 September 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3 and 5-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-8, 10-15, 19 and 20 is/are rejected.
- 7) ☒ Claim(s) 9 and 16-18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 September 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

Amendment on drawing filed on 09/05/2007 to comply with 37 CFR 1.84(p)(4) is accepted.

Terminal disclaimer filed on 09/05/2007 to comply with 37 CFR 3.73(b) is accepted.

The claim amendment filed on 09/05/2007, addressing claims 1-8, 10-15, 19 and 20 rejection from the first office action (06/05/2007) and canceling claim 4, is acknowledged and will be addressed below.

### ***Terminal Disclaimer***

Double patenting rejection in the first office action has been overcome by the terminal disclaimer. Double patenting rejection has been withdrawn.

### ***Response to Arguments***

1. Applicant's arguments filed on 09/05/2007 have been fully considered but they are not persuasive.

For claims 1 and 13, applicant argues that the draining unit (space below hot plate #280 and shower head #308, including shadow plate #324, of Schmitt et al. US 6596085, hereafter '085), is not properly a draining unit (page 10 of argument/remarks) because Fig. 2 of '085, "is to prevent the flow of liquid material to the wafer surface by capturing and secondarily vaporizing such liquid. ... would more closely correspond to a source gas diffusion space than a draining unit".

While applicants cites some of the functions of Fig. 2 of '085, the applicant has not point out what is structurally missing from the draining unit in applicant's claims and specification. "Gas draining port" (specification, page 4, line 20) requires the draining unit to pass gaseous material through, which the space below #280 of Fig. 2 of '085 is structurally capable of. Therefore, the argument pertaining to claims 1 and 13 are found not persuasive.

As for claims 2-3, 5-8, 10-12, 14, 15, 19, and 20, applicant argues they are allowable if claims 1 and 13 are allowable. As the argument for claims 1 and 13 are not persuasive, claims 2-3, 5-8, 10-12, 14, 15, 19, and 20 are not allowable.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3, 5-6, 13-15 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Schmitt et al. (US 6596085, hereafter '085).

'085 teaches all limitations of claim 1:

A gas reaction apparatus comprising: a vaporizer (col. 8, lines 17-21, shown as #12 in Fig. 1, including #204 valve body and #280 hot plate in Fig. 2) for producing a reaction gas by vaporizing a liquid source material (Fig. 2, #208 a liquid precursor supply line, col. 4, lines 55-58); and a reaction chamber (Fig. 1, #18, deposition chamber) in which the reaction gas reacts (deposition is a reaction), wherein the

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vaporizer is configured as a unit for constituent members forming the reaction chamber (#12 is a constituent member forming the top of reaction chamber #18), and the reaction gas produced in the vaporizer is directly introduced into the reaction chamber (vaporized gas in #280 is fed directly into the reaction chamber #18, without passing through any outside line), wherein the vaporizer includes a spraying nozzle (nozzle #240 is disclosed in col. 5, lines 46-60, #240 was not labeled in Fig. 3. #240 is right above #224a. Fig. 3 (#204) is part of vaporizer #12), a vaporizing chamber (Fig. 2, #274) forming a spraying space of corresponding spraying nozzle, a narrow passageway (Fig. 2 and Fig. 5, #282) communicating with corresponding vaporizing chamber, a draining unit (Fig. 2, space below hot plate #280 and above the shadow plate #324) communicating with corresponding narrow passageway and the reaction chamber (#18), and a source gas diffusion space (Fig. 2, space below the shadow plate #324 and above the shower head #308) communicating with the draining unit and the reaction chamber.

'085 further teaches the limitation of claim 2:

The vaporizer (Fig. 1, #12) is directly formed at an outer side of a gas introduction unit (Fig. 2, showerhead #308, part of deposition chamber Fig. 1, #18) for introducing the reaction gas into the reaction chamber. (Vaporizer #12 is at outer side of gas introduction unit #308).

'085 further teaches the limitation of claim 3:

The vaporizer (Fig. 1, #12) is formed above the reaction chamber (#18).

'085 further teaches the limitation of claim 5:

The narrow passageway is formed of one or more passageways annularly disposed (Fig. 5, #282 holes are annularly distributed) around the vaporizing chamber, and an annular draining passage (orifices #344 in shadow plate #324 are annularly distributed) communicating with the narrow passageway is disposed in the draining unit.

'085 further teaches the limitation of claim 6:

A heater unit (Fig. 2, #280 hot plate and #292 heating jacket) for heating inner surfaces (#272, which is connected to #292) of the vaporizing chamber and the narrow passageway (#282, which is connected to #280).

'085 teaches all limitations of claim 13:

A semiconductor processing apparatus, comprising: a vessel forming a processing chamber (Fig. 1, #18) for processing a substrate to be processed, the vessel having a upper plate (Fig. 2, #19, lid) capable of being attached thereto and detached therefrom (col. 4, lines 62-65); a supporting member (#312, susceptor), disposed inside the vessel, for supporting the substrate (#316) to be processed; a showerhead (#308) for supplying a processing gas into the processing chamber, the showerhead being disposed below the upper plate to face the substrate supported by the supporting member; a vaporizing chamber (#274), disposed on the upper plate, for producing the processing gas by vaporizing a liquid source material (from #208); a gas passage (#282 of hot plate #280 and #284 of the lid #19, col. 8, lines 5-8), configured to communicate with the vaporizing chamber for flowing the processing gas; and a draining unit (Fig. 2, space below hot plate #280 and above the shadow plate #324) communicating with corresponding narrow passageway and the reaction chamber (#18), and a source gas

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diffusion space (Fig. 2, space below the shadow plate #324 and above the shower head #308) communicating with the draining unit and the reaction chamber.

'085 further teaches the limitation of claim 14:

The vaporizing chamber is formed as a space between the upper plate (Fig. 2, #19, lid) and a cap (atomizer stage #200 and chamber body #270, together, formed a cap) installed on the upper plate.

'085 further teaches the limitation of claim 15:

The gas passage includes a narrow passageway (Fig. 2, #282) formed by a fine gap of 0.5-10.0 mm (col. 7, lines 49-54, see more discussion below) between the cap and the upper plate (#282 is in between of #270 and lid/upper plate #19), and the narrow passageway serves as a path for vaporizing a mist contained in the processing gas.

Note the examiner reads the phrase "between the cap and the upper plate" as describing the narrow passageway, in a broadest interpretation of the claim.

'085 discloses the claimed invention except for "a fine gap of 0.5-10.0 mm". It would have been obvious to a person having ordinary skill in the art at the time the invention was made to experimenting the size of passageways #282, as described as an result-effective variable "to reduce or eliminate any substantial pressure drop across the hot plate" (col. 7, lines 49-54), and 10.0 mm size #282 is sufficiently large to reduce the pressure drop. In MPEP2144.05 IIB, it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

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'085 further teaches the limitation of claim 19:

A spraying nozzle (col. 5, lines 46-60, Fig. 3, the nozzle #240 was not labeled, is right above #224a. #204 is part of vaporizer #12); installed at the cap (#200), for spraying the liquid source material into the vaporizing chamber.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
3. Claim 7-8 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over '085, further in view of Sun et al. (US 6409839, hereafter '839).

'085 teaches all the limitations of claim 5, as discussed above.

'085 does not teach:

A filter for capturing solid or liquid phase materials in the reaction gas is disposed inside the draining passage.



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'839 is an analogous art in the field of vaporizer for CVD, particularly, in solving the problem of clogging of vaporizer ('085, col. 2, lines 59-62 and '839, col. 2, lines 22-25). '839 teaches that the mixture gas carrying particulate contaminants is harmful to wafer in CVD process (col. 2, lines 22-25). '839 provides a heated porous filter between the vaporizer and the CVD chamber (col. 3, lines 59-60). '839 teaches the integration of vaporization function, filter, and the heated flow restriction in one draining unit (col. 9, line 66 to col. 10, line 2, the housing is a draining unit, filter #160 in Fig. 11). Furthermore, the filters can be arranged as desired within the draining unit (col. 9, lines 23-27. Therefore, '839 teaches that the filter can be installed at the inlet portion of the draining unit.)

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have combined '839 with '085. Specifically, to have added a filter at the inlet of the draining unit (Fig. 2, at position #284, the opening of lid #19, optionally at the top of #284 and in contact with the heater block #280) for the purpose of reducing the contaminants due to particulates from vaporizer with a reasonable expectation of success; therefore, to have arrived the invention of claim 7.

'085 and '839 teach all the limitations of claim 7, as discussed above.

'085 does not teach the limitation of claim 8:

The filter is disposed at a draining port of the draining passage, which communicates with the reaction chamber.

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'839 teaches the filter disposed at the draining port (Fig. 11, #160 is at outlet portion which is then connected to the CVD chamber, #26 of Fig. 9) and a valve (#100) the open and close the draining port, in the vicinity of the filter.

For the same reasons given in claim 7 rejection above, at the time the invention was made, a person of ordinary skill in the art would have added the filter at the draining port (in the holes of #344 in Fig. 2 of '085) with a reasonable expectation of success; therefore, to have arrived the invention of claim 8.

'085 and '839 teach all the limitations of claim 7, as discussed above.

'085 further provides the limitation of claim 10: a heater unit (Fig. 2, #280) for heating the filter (that have been added to the top of #282).

Note that this heating unit is in keeping with the teaching of '839 (Fig. 11, #158, col. 3, lines 59-60, and col. 10, lines 14-17).

'085 and '839, together, teach all the limitations of claim 10, as discussed above.

'085 further teaches the limitation of claim 11:

The filter (that have been added to the opening #284) makes a thermal contact with an inner surface of the draining passage (the wall of lid #19 facing #284), and is heated by the heater (#292 and #280) through the inner surface of the draining passage.

'085 and '839, together, teach all the limitations of claim 11, as discussed above.

The limitation of claim 12 is substantially the same reason as discussed in claim 7 rejection above. At the time the invention was made, a person of ordinary skill in the art would have placed the filter at the top of #284 and in contact with the heater block

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#280, for the additional reason from the teaching of '839 (col. 10, lines 14-17), to further fulfill the purpose of reducing the contaminants due to particulates from vaporizer with a reasonable expectation of success; therefore, a heat transfer unit (the outside of the heater unit #280, as opposed to the resistance heating element itself) is in thermal contact with the filter to have arrived the invention of claim 12.

4. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over '085, further in view of Pang et al. (US 6517634, hereafter '634).

'085 teaches all limitations of claim 14, as discussed above.

'085 does not explicitly teaches the use of a hinge to facilitate the attachment and detachment of the upper plate (#19) and cap (#200).

'634 is an analogous art in CVD, particularly in chamber lid assembly. '634 teaches the use of a hinge assembly with two pivot points that minimize abrasion.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have combined '085 with '634. Specifically, by append a hinge assembly ('634, Fig. 1, #170) to facilitate the attachment and detachment requirement specified in '085 (col. 4, lines 62-65) to minimize abrasion as taught by '634. This hinge assembly ('634, Fig. 1, #170) has the capability to rotate the upper plate and the cap as a unit around the hinge as a center with respect to the main body of the vessel. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to have combined '085 with '634 to have obtained the invention of claim 20.

***Allowable Subject Matter***

5. Claims 9 and 16-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: '085 teaches a valve near the injection nozzle (Fig. 2, #204) and a valve at the outlet of processing chamber (#338), but does not fairly teach a valve at the draining portion of the vaporizer. '839 teaches that the outlet valve can be integrated with the vaporizer (col. 10, lines 2-3, moving #100 into the chamber in Fig. 11). Neither prior art teach to surround/encircle the valve body with a filter.

'085 teaches the integration of vaporizer with the lid of the processing chamber as shown in Fig. 2. '085 does not fairly teach a protrusion defining a sidewall of the vaporizing chamber is formed on the upper plate and the narrow passageway is formed between a top surface of the protrusion and an inner surface of the cap.

The above subject matter is allowable, subjected the context of vaporizer for gas reaction apparatus or semiconductor processing apparatus as specified by the parent claims.

**Conclusion**

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keath T. Chen whose telephone number is 571-270-1870. The examiner can normally be reached on M-F, 8:30-5:00 EST.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

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USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KC *K-C*

  
MICHAEL B. CLEVELAND  
SUPERVISORY PATENT EXAMINER